ATTACHMENT - REMARKS

By this Amendment, independent claims 77 and 90 (and similarly withdrawn but re-joinable independent claim 93) have been amended to better define the invention. In addition, the restricted out and previously withdrawn method claims have been canceled to place the application in better condition for allowance. It is submitted that the present application is in condition for allowance for the following reasons.

In the *Claim Rejections - 35 USC § 103* section of the outstanding Detailed Action, independent claims 77 and 90 together with associated dependent claims 78-85, 87-89 and 91-92 were rejected under 35 USC § 103 as being obvious over Klinck in view of Baur. However, for the following reasons, it is submitted that all of these claims are allowable over this combination of references.

USP 3548586 to Klinck discloses a composite balance wheel structure whose object is to provide low eddy current losses whilst maintaining a high moment of inertia to mass ratio (see abstract and column 2, lines 68-72). The balance wheel (22) in Klinck comprises a rim (24) supported by an arm (26) which has a plurality of radial spokes (28, 30, 32). Part of the rim is formed by a current carrying coil (drive coil (38)). In use, the balance wheel disclosed in Klinck is "driven by the interaction of a magnetic field and a current carrying coil" (see column 1, lines 31-32). The balance wheel in Klinck therefore necessarily includes a magnetically sensitive part in order to operate.

As noted in section 3 of the Office Action, the balance wheel claimed in claim 77 is nonmagnetic. Therefore, it will initially be appreciated that a skilled person would not replace the magnetically sensitive material in Klinck's balance wheel with a non-

magnetic material because the balance wheel in Klinck then would not function properly.

In the Action, the examiner in making the combination rejection stated that Baur "teaches a non-magnetic alloy suitable for many components of clocks and watches [abstract]." However, the entire teaching of US 5881026 (Baur) relates expressly to materials for balance springs; and that is what is specifically stated in the abstract as a careful reading will show. Nowhere in Baur is it suggested that the spring material would be used for any other component. Clearly the properties required for a spring are different from those required for a balance wheel, so in any event it would not have been obvious for a skilled person to use Baur's spring material in the balance wheel of Klinck.

It is also noted that Klinck specifies that its rim is formed from "a conductive metal of high density and low magnetic impurity content as well as high tensile strength and hardness" (see column 3, lines 14-16). Prescribed properties of materials in the rim are also set forth in column 8, lines 5-8 of Klinck. No suggestion in made in either Klinck or Baur that the material disclosed in Baur could, let alone would, fulfill these requirements as explicitly set forth in Klinck.

Therefore, for all of the reasons as noted above, it is initially submitted that it would not be obvious to make the magnetic balance wheel of Klinck from the non-magnetic spring material taught in Baur. Therefore, the combination suggested by the examiner would not be obvious; but rather it appears to be the result of an impermissible hindsight reconstruction since there would be no motivation to do so and to do so would result in an inoperable device.

It is also submitted that the balance wheel in Klinck includes the drive coil, because without the drive coil the remaining components are clearly not arranged in equipoise, as equipoise is required by independent claims 77 and 90. Accordingly, it is impossible to combine Baur and Klinck as suggested by the examiner to arrive at an operational balance wheel that is in equipoise and is non-magnetic as claimed.

Furthermore, several elements recited in independent claims 77 and 90 are not disclosed in Klinck.

Most significantly, claims 77 and 90 as now amended clearly recite that the components having two different thermal expansion coefficients are arranged "to cause a decrease in the moment of inertia with an increase in temperature" [emphasis added]. In Klinck, an increase in temperature will cause expansion of the materials that make up the balance wheel to be away from the center of the wheel. This expansion causes an increase in moment of inertia with an increase in temperature. In contrast thermal expansion in the embodiments of the invention causes matter to move towards the center of the balance wheel, which causes a decrease in moment of inertia with increase in temperature as claimed.

By this Amendment, it will be noted that independent claims 77 and 90 are amended to clarify the presence of two different non-magnetic materials which are arranged to provide the above noted expansion feature.

Similarly, independent claims 77 and 90 recite a "thermally compensating balance wheel". Klinck neither discloses nor suggests that its balance wheel performs any thermal compensation. At column 8, lines 51-54, Klinck discloses that "the coefficient of thermal expansion for the composite balance wheel and arm should

closely match that of the material selected for fabrication of the hairspring". No further consideration is given to thermal compensation in Klinck. It is noted further that Baur discusses free mechanical oscillators, whereas Klinck refers to electrically driven oscillators. Those of ordinary skill appreciate that compensation considerations for free oscillators are not relevant for driven oscillators.

Therefore, for all of the foregoing reasons, it is submitted that amended independent claims 77 and 90 are not made obvious by a combination of Klinck with Baur, so that claims 77 and 90 are therefore now allowable. For these same reasons, it is submitted that withdrawn independent claim 93 is also allowable; and that all of the dependent claims which depend from either claim 77 or 90 are also allowable.

Regarding independent claim 90, it will also be noted that the balance staff (40) in Klinck is not in fact formed integrally (i.e., in one piece) with the balance wheel as additionally claimed therein. Rather, it is mounted on the arm (26), but it is separate from all of the rim (22), the arm (26) and the coil (28). Therefore, for this additional reason, it is submitted that independent claim 90 is additionally allowable over the combination of Klinck with Baur.

Regarding dependent claim 91, the Office Action provides no prior art citation suggesting that a ceramic material may be used to form a balance wheel. Klinck specifies that its balance wheel rim is formed from "a conductive metal of high density and low magnetic impurity content as well as high tensile strength and hardness" (see column 3, lines 14-16). The section of Klinck cited in the Office Action (column 2, lines 57-67) actually discloses that significant difficulty has been encountered in obtaining non-metallic materials suitable for use with the Klinck mechanism. Therefore, taken as a

whole, Klinck teaches directly against using non-metallic materials, such as ceramic, in a balance wheel. Dependent claim 91 is consequently additionally allowable for this reason.

In the Allowable Subject Matter section, it was indicated that dependent claim 86 contained allowable subject matter. This indication of allowable subject matter is appreciated. It is submitted that claim 86 is now allowable based on its dependence from now-allowable independent claim 77 from which it depends.

For all of the foregoing reasons, it is submitted that the present application is in condition for allowance and such action is solicited.

Respectfully submitted,

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/Douglas E. Jackson/
By: Douglas E. Jackson
Registration No.: 28,518

STITES & HARBISON PLLC • 1199 North Fairfax St. • Suite 900 • Alexandria, VA 22314
TEL: 703-739-4900 • FAX: 703-739-9577 • CUSTOMER NO. 881